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mand for them, but against the adoption of manual training as a part of the general educational course. At the close of the discussion one of the members moved that a committee of the association be instructed to define the term "manual training," which would certainly seem to be a proper and even necessary thing to do, if there is ever to be an agreement about the expediency of such training. But the motion raised a perfect storm of opposition, so that the chairman had to interpose a few remarks to prevent an acrimonious dispute. Another important subject treated was that of examinations, especially the examination of teachers, which was recognized as at once a work of great importance and of great difficulty. Candidates for the position of teacher are now often examined by persons with no real fitness for the task, and some remedy for this evil is undoubtedly necessary. Besides these topics, the assembled superintendents discussed the training of teachers, the duties of principals, and other themes that need not be specified here.

#### LETTERS TO THE EDITOR.

*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

*On request, twenty copies of the number containing his communication will be furnished free to any correspondent.*

#### Heat and Ventilation.

In your issue of Feb. 28 is a notice of the Timby system of heating and ventilation, which, you say, "is now attracting universal attention, especially in New England." It is to be hoped that New England will not miss the delicate touch of flattery perhaps unconsciously given her in this quotation, and that your columns are open to any voice of intelligent response which may come back from her.

The attention of which you speak is not stated to be that of competent engineers, nor that of others better qualified than "ex-mayors" to judge of the merits of the described system. It is not defined as that of either scientific sanction or condemnation.

But the appearance of the article in *Science*, and without unfavorable comment, would seem to the popular mind to lend a quasi-scientific approval to the enterprise, as it doubtless has afforded gratification to its promoters.

The art of ventilation has suffered much injury at the hands of many whose ingenuity has not been the well-trained servant of a sound scientific knowledge. The field is a fertile one for the culture of schemes and methods more visionary than practicable, and more gratifying to inventors than profitable to users. To protect the public against imposition, to save the popular mind from discouragement through repeated and costly failures, to expose and weed out the worthless methods from the good, and to establish popular faith by evidence of actual or possible success in any worthy undertaking, is a legitimate and laudable service for any man or journal capable of rendering it.

To this end it would afford satisfaction to see in your columns a thoroughly trustworthy discussion of the applicability of the Timby system to the actual necessities of good ventilation and heating. With a view to eliciting contributions to such a discussion, the following propositions are submitted:—

First, The mechanical part of the problem is beset with insuperable difficulties of various sorts, some of which are closely akin to those belonging to the long ago demonstrated impracticable scheme of ventilating a city's sewers by a centrally located system of pneumatic exhausters.

In the company's pamphlet, and under the head of "Plan of Introduction," the statement is made that it is proposed to heat and ventilate a town of 50,000 inhabitants by means of one centrally located plant.

The first essential in ventilation is an adequate air volume, and the second is an effective use of it. If the dermal and thoracic excretions are to be diluted to one in two hundred, — a proportion of diluent which for the pelvic excretions would be considered far too small to fit them for potable or edible use, — the air-supply for such a town should be 150,000,000 cubic feet per hour; and for the sweetening of the 2,000 buildings of 50,000 cubic feet ca-

capacity each, in which the inhabitants may, for the purposes of computation, be supposed to compactly live, the air-supply should reach at least that quantity. Let it be reduced to 100,000,000, and, for the sake of simplifying the mechanical problem, let the houses be ranged along two intersecting streets, 500 houses to each half-street, and let the ventilating plant be located at the point of intersection. Let the houses stand in compact block form, and average, with alley and cross-street spaces, forty feet frontage. Let each of the main air-conduits be six feet in diameter, and the central supply-shaft twelve feet. The velocity of air-flow through the main conduits would be nearly 15,000 linear feet per minute, and the theoretical power required to propel the air would be about 125,000 horse-power, 4,000 being required to give the air its initial motion, and the balance to overcome the resistance of friction. This computation takes no account of the further work required for moving the air through leads to the 2,000 buildings, and through the ramifying conduits for its distribution to their several floors and rooms.

The above computations are qualified as theoretical, since it is assumed that the efficiency of the motile machinery employed is unity instead of the one-third or one-fourth usually available in such mechanism. It would be interesting and instructive to examine a description of the apparatus it is proposed to use for the propulsion of such large volumes of air under the high pressure demanded. To effect the pressure by blowers, the velocity of their blade-tips would have to exceed that of a rifle-shot, and a twenty-foot diameter fan must make the quite impossible performance of 1,800 revolutions per minute.

Let the question be simplified to that of supplying air to two such buildings as the newer ones of the Massachusetts Institute of Technology, they monopolizing an entire main, and being located at its extremity. The theoretical horse-power required would be some 345, against a present actual mean of 15 or so, for the supply of 5,600,000 cubic feet of air an hour.

Second, The method proposed for warming the air supplied through the mains by means of a hot-water pipe with return bend, as shown in the cut reproduced by *Science*, and described in the company's pamphlet, is defective.

The pamphlet states that the pressure within the pipe is not to exceed five pounds, and that the heat-loss in the water is not to exceed five per cent. The statement, though somewhat ambiguous, may reasonably be made to mean that the water starting with a temperature of 227° will return to the heater cooled through 12°.

If the sole aim of this warming of the air were to raise it to the temperature of comfort, say 70°, before supplying it to the buildings, and the matter of heating the buildings were excluded from consideration, the volume of water to be moved through the pipe would, on a day of average winter temperature, be nearly 200,000 gallons an hour, or a flow rate of nearly five miles an hour through a fourteen-inch pipe.

For extreme weather this quantity must be more than doubled, and, if the heating of the buildings is to be included, the duty of the heating system must be quadrupled.

A study of the mechanical part of this heating problem is not here presented.

Presumably the small fraction of the exhaust steam from the air and hot-water propelling engines required for heating purposes would be utilized. Enough would still remain for the comfortable heating of some halfscore of adjacent towns of rival size.

A description of the arrangement of the proposed pipe or other heating surface, so that cumulative heating effect should be avoided, and a uniform temperature maintained throughout the mains, would interest many of your readers.

Third, The required inequalities of temperature in the air-supply to various buildings, and to the various parts of the same building, cannot be furnished from one supply source maintained at a fixed temperature.

For the shady or the windward side of a dwelling whose air is "changed" but once an hour, the air-supply temperature may need to be in some weathers 190° or 200°; and on the sunny or the leeward side, or in the sleeping or sick room, twenty to thirty de-

greens lower; and at the same time the air supplied to a theatre, hall, or church must have a temperature of from 60° to 80°. Hence the impossibility of meeting all requirements of both heating and ventilation with air from one supply source at a fixed temperature.

S. H. WOODBRIDGE.

Boston, March 20.

### Sound-English.

IN your review of my "Sound-English, a Language for the World," in your issue of March 21, you make some statements to which, I am sure, your well-known fairness will allow me to offer a correction.

You say that I propose "to introduce at first five new letters, to be followed by six more at a later time," and that you "gravely doubt if any system can be brought into use that contains new letters; and, if new letters are to be introduced, there are other systems that have quite as good a claim to be adopted" as mine.

Now, the fact is that I do not introduce a single new letter. I distinctly state it as my idea of the "requirements of a phonetic alphabet" (see p. 21) that "the present equipment of any printing-office must suffice, without the necessity of casting new types or even employing diacritical marks," and that "all the leading type-writers now in use must be adapted or easily adaptable to the new system without destroying their usefulness in writing the present spelling." My whole system is worked out in conformity with this principle. It is the principal claim I make for its superiority over other systems. If you will kindly turn to the "specimen page" from Macaulay's "History," on p. 51, you will not find a single sign which could not be set up to-day in any village newspaper-office between Maine and California.

To distinguish *a* in *at* from *a* in *ask*, I propose a slight alteration in the type, which may be effected with a penknife; but this is a trifling matter, so much the more as we do not require any distinction between the two sounds in ordinary reading-matter.

I do not know of any perfectly phonetic system of spelling in which the same result is attained, if we except Mr. Ellis's "Glossic;" but, then, he employs vowel digraphs, while I do not employ a single vowel digraph, excepting, of course, the three regular diphthongal sounds *ou*, *oi*, and *ai* (in *aisle*).

I do propose five very simple alterations for the script; and I say, further, that in course of time, when "Sound-English" will be firmly established, type-founders will provide us with

more appropriate forms to designate some of the sounds; and then, merely for the purpose of offering a complete system, I venture to suggest what these forms ought to be. But I am far from advocating their immediate introduction.

As for the expediency of designating the long vowels by full-faced type, and in script by shading, it is, of course, a matter of opinion. You think it an insurmountable obstacle; for, as you say, "who will take the trouble, in rapid writing, to shade now and then a letter more heavily than the rest?" Now, in the first place, "the rest" are not shaded at all in my system. In the second place, do not many systems of stenography distinguish sonant from surd consonants by shading? And do not stenographers write rapidly?

In conclusion, I beg to call attention to the fact that I employ full-faced type and shading not only for the long vowels, but also for designating the accent,—a feature which I think to be as important as it is original; for I do not know of any system of spelling, in any language, in which the accent is thus designated, symbolically, without employing a special sign.

I hope you will not consider this as a fault-finding review of your review, coming from an author who cannot bear adverse criticism. It is intended only as a courteous request for permission to lay my own statement of the facts before the select circle of thinkers who subscribe for your excellent journal.

A. KNOFLACH.

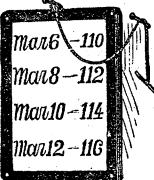
New York, March 28.

### Do the Barclayan Descriptive Terms occasion Obscurity?

IN the *American Naturalist* for October, 1889, p. 923, the notice of Stowell's cranial nerve studies concludes with the remark that "the adoption of the Wilderian adjectives and adverbs renders them somewhat pedantic and obscure." The title of this communication attributes to Barclay, the anatomical preceptor of Richard Owen, the exact descriptive terms which have been employed by many writers, and which I merely adopted in 1880 at the Boston meeting of the American Association for the Advancement of Science. The charge of pedantry is not new; but, as that is a matter of custom and taste, it may be overlooked. Since, however, the very purpose of the Barclayan toponymy was to eliminate the obscurity which lurks in every anatomical treatise or paper known to me in which those or equally exact descriptive terms are not used, I am anxious for specifications on this head, and trust they may be presented in response to this letter.

BURT G. WILDER.

Ithaca, N.Y., March 29.



**GAIN**

**ONE POUND**

**A Day.**

A GAIN OF A POUND A DAY IN THE CASE OF A MAN WHO HAS BECOME "ALL RUN DOWN," AND HAS BEGUN TO TAKE THAT REMARKABLE FLESH PRODUCER,

**SCOTT'S**

**EMULSION**

**OF PURE COD LIVER OIL WITH Hypophosphites of Lime & Soda**

IS NOTHING UNUSUAL. THIS FEAT HAS BEEN PERFORMED OVER AND OVER AGAIN. PALATABLE AS MILK. ENDORSED BY PHYSICIANS. SOLD BY ALL DRUGGISTS. AVOID SUBSTITUTIONS AND IMITATIONS.

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This new method of "one remedy for one disease" must appeal to the common sense of all sufferers, many of whom have experienced the ill effects, and thoroughly realize the absurdity of the claims of Patent Medicines which are guaranteed to cure every ill out of a single bottle, and the use of which, as statistics prove, has ruined more stomachs than alcohol. A circular describing these new remedies is sent free on receipt of stamp to pay postage by Hospital Remedy Company, Toronto, Canada, sole proprietors.



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